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THE HUMAN SIDE OF UNCLE SAM  
Nation's School of the Air

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BUREAU OF CHEMISTRY AND SOILS

A conversation between Dr. W. W. Skinner, Assistant Chief, Bureau of Chemistry and Soils, and Charles Herndon, student in Paul Junior High School, Washington, D. C. For broadcast Thursday, March 2, 1939, in Nation's School of the Air series.

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CINCINNATI ANNOUNCER:

It's time for one of our regular visits with Uncle Sam and his representatives in Washington. Today we shall learn about the activities of the Bureau of Chemistry and Soils. In the studios of Station WOL in the Nation's Capital are Dr. W. W. Skinner, Assistant Chief of the Bureau of Chemistry and Soils and Charles Herndon, a student in the Paul Junior High School in Washington. Dr. Skinner, it's been some time since I sat in a class on chemistry -- so when you start discussing topics like molecular weights, hydrogenation of oils and things like that -- I'll be an interested member of your audience.

(SWITCH TO WASHINGTON)

DR. SKINNER:

Well, I don't know whether we'll talk about things as technical as that or not. Let's leave it up to Charles, here, to decide what we talk about.

HERNDON:

I'm afraid I don't know enough about chemistry yet to understand all that business about molecular weights -- and --- hy---hy---

SKINNER:

Well -- it really doesn't matter what was said about oils, Charles. Or do they usually call you Chuck?

(over)



HERNDON:

They usually call me Chuck.

DR. SKINNER:

Then, if you don't mind, that's what I'll call you---Chuck.

You haven't studied chemistry as yet, have you, Chuck?

HERNDON:

No, sir---not in school. I've had a little chemistry set at home that I've worked with.

DR. SKINNER:

Then you're beginning to get some idea of how interesting--- as well as how complicated--chemistry can be.

HERNDON:

Yes I am. Are all the men in the Bureau of Chemistry and Soils--- chemists?

DR. SKINNER:

No---not by any means. They all need to know something about chemistry, of course---but we have men who have made a specialty of studying soils---others who are experts in the study of bacteria---some are engineers. You see, the work of our bureau covers many different subjects.

HERNDON:

I wonder if you could tell me just what your bureau does, Dr. Skinner.

DR. SKINNER:

Well Chuck, the chemists of the Department of Agriculture have worked on so many different problems in the 77 years which the Bureau has existed that we can't possibly touch on all of them. About all we can do is pick out a few of the more interesting and more important ones.



HERNDON:

That'll be fine with me, Dr. Skinner. What's one big job that you've done?

DR. SKINNER:

Well---one big job that we've worked on for years and have about half done---is the job of mapping the farm land of the United States to show the kinds of soil.

HERNDON:

Gee---that does sound like a big job---mapping all the farm land in the United States. But---can't you use the maps that are already made. We've got good maps in school.

DR. SKINNER:

I know, Chuck---but a soil map must show much more than your maps in school. As a result of long years of study, our men know that there are different types of soil---some of them very fertile--some not so fertile; some very well suited to corn--others to cotton---wheat--vegetables, and so on. Our men who are well trained in the study of soils have gone out over the country---taking one county at a time---and have covered the ground on foot---taking samples of soil---making drawings that would show where there are hills valleys and streams---and everything else that would have some bearing on the soil.

HERNDON:

And you say that job is about half done?

DR. SKINNER:

Yes, we have completed soil surveys on about half of the agricultural land in the United States. Now--remember--that's only one of many things our bureau does. In fact, Chuck---I suspect you'd have difficulty in finding an





object that has not been improved in some way by our work.

HERNDON:

Isn't that---well--sorta sticking your neck out---to make a statement like that, Dr. Skinner? Seems to me you take in a lot of territory.

DR. SKINNER:

I realize that, Chuck---but I'll try to back up what I've said. Suppose you point out something and we'll see if the Bureau hasn't done some work on it.

HERNDON:

All right -- How about---well---how about the floor in this studio?

DR. SKINNER:

You couldn't have picked a better example, Chuck. This happens to be a linoleum floor.

HERNDON:

That's right.

DR. SKINNER:

Well----probably you know that no agricultural crop has increased more rapidly in its production during the last few years than soybeans. It's a good crop for farmers in many parts of the country---and we are learning that the soybean has many different uses. One use that has been found for soybeans is in the making of-----

HERNDON:

Linoleum?

DR. SKINNER:

Yes. Linoleum---and many other things. I suppose you eat chocolate candy once in a while, don't you?



HERNDON:

Of course I do---I like it.

DR. SKINNER:

There's a material found in soybean oil which is useful in keeping chocolate candy from turning white; so more and more of it is being used for this purpose. And an even more important use for the oil from soybeans is in making paint and varnish.

HERNDON:

Why--I thought they used linseed oil in paint and varnish. At least that's what a painter told me one time.

DR. SKINNER:

He was quite right----but we've found in recent years that we can replace part of the linseed oil with soybean oil-----and give the farmer a new market for one of his crops. And there's still another important use for soybeans----in the making of plastics.

HERNDON:

What are plastics, Dr. Skinner?

DR. SKINNER:

Hmm----that's rather hard to define, Chuck. But in general----plastics are materials that can be pressed or moulded into different shapes---like fountain pens, telephone receivers, automobile steering wheels, and so on.

HERNDON:

To look at soybeans---you wouldn't think that so many things could be made from them.

DR. SKINNER:

No, you wouldn't, Chuck. But perhaps we'd better leave soybeans--and talk about something else. Do you like pickles?



HERNDON:

Sure I do.

DR. SKINNER:

Well I don't know whether you realize it or not---but up to a few years ago it was said that it wasn't possible to produce good cucumber pickles in the southern states, because the weather was too hot there.

HERNDON:

You mean the cucumbers wouldn't grow?

DR. SKINNER:

No---not that. They grow very well----but there seemed to be something that kept them from "pickling" properly. Hot weather took the blame for many years. But some of our scientists found that it was a problem of micro-organisms.

HERNDON:

A problem of what?

DR. SKINNER:

Micro-organisms. "Micro"---means so small you have to use a microscope to see them----Our men worked out a method of controlling these micro-organisms--or bacteria--in the pickling vats-----and today they're making first class pickles in the southern states. And speaking of the southern states----there's another industry down there in which the Bureau of Chemistry and Soils has been of a great deal of help---the naval stores industry.

HERNDON:

Naval stores? What kind of an industry is that?

DR. SKINNER:

Well---naval stores means rosin and turpentine.



HERNDON:

Rosin and turpentine. How do they happen to be called "naval stores?"  
Do they use them in the navy?

DR. SKINNER:

Not much any more, (Chuck---but that name dates back a good many years to the time when all ships were made of wood. In order to keep the ships from leaking, they had to be tightly caulked with cotton or jute treated with tar made from pine gum. Later some of this pine gum was separated into turpentine and rosin and these products were sold by the ship chandler along with his other naval supplies.

HERNDON:

But after they began to make ships out of steel, there wasn't much use for the pine gum, was there?

DR. SKINNER:

No---but other industries found a use for the turpentine and rosin. When you washed your face this morning you may have used some rosin---in the soap. And I wonder if you shined your shoes before breakfast?

HERNDON:

Well---not this morning---but I did yesterday.

DR. SKINNER:

Did you notice a characteristic smell to the shoe polish?

HERNDON:

Well--- it smelled like shoe polish.

DR. SKINNER:

Yes--of course---but I wonder if part of that smell wasn't the smell of turpentine.





HERNDON:

Say---now that you mention it, Dr. Skinner---shoe polish does smell kinda like turpentine.

DR. SKINNER:

That's because there's turpentine in shoe polish. And it's used as a thinner for paints and varnish---and for many other purposes. The production of turpentine and rosin is an important business in the southeastern states.

HERNDON:

I know turpentine and rosin---come from pine trees, but how are they made?

DR. SKINNER:

They are made from certain types of southern yellow pine. Turpentine and rosin are made from gum which runs from wounds intentionally put on the pine each week. The gum is then distilled; the liquid part is turpentine and the solid part is rosin. Our scientists have made many improvements in the methods of tapping the trees and distilling the rosin and turpentine--setting up grades and standards--and many other helps to the industry. To the outsider, some of those things may seem rather unimportant---but they have meant a great deal to the three hundred thousand or more people interested in the production of naval stores.

HERNDON:

Well, I suppose that if you help an industry make better products that helps anyone who uses those products, doesn't it?

DR. SKINNER:

Indeed it does, Chuck. Now---let me tell you about another industry in the southern states----a brand new industry. The business of making starch from sweetpotatoes.



HERNDON:

From sweetpotatoes! I thought starch came from corn. At least that's what it says on the box---"corn starch."

DR. SKINNER:

That's right, Chuck---most of the starch in this country does come from corn--. But about one-third of the starch which we use in this country comes from certain roots which do not grow here but have to be imported. Now--I wonder if you see what that means.

HERNDON:

I'm not sure----but it looks to me as though there's no use in importing this stuff--if we can produce something in our own country that's just as good.

DR. SKINNER:

That's the point, exactly. Sweetpotatoes contain a considerable amount of starch---we've known that for a long time. But it was expensive to get it out--and even then, the starch was yellow. For most purposes, we want starch that is white. So---our men worked on the color problem--and on methods of manufacture that would cut down the cost. At the present time we can make starch from sweet potatoes almost as cheaply as from any other source---it's white in color---and for many purposes it's better than ordinary starch.

DR. SKINNER:

Right now there's only one at Laurel, Mississippi----but there'll probably be others before many years. Now for another product - Do you see the material in this bottle, Chuck?

HERNDON:

Yes--I see it. Looks like coarse salt.

DR. SKINNER:

Yes--it does. But it isn't. It's a product known as calcium gluconate.



It once saved the life of a King. Some of the men in our bureau developed this material. It's used by doctors on patients who need more calcium--more lime---in their blood. Several years ago the king of a great country was very sick. Part of his illness was caused by a lack of calcium.

HERNDON:

Did your bureau help supply his doctors with calcium?

DR. SKINNER:

Yes it did. We supplied all that was needed. And the king recovered from his illness. That was several years ago---and since that time the drug has been made in much larger quantities; so it is quite cheap today and is available almost anywhere in the civilized world.

HERNDON:

Gee-----that story's exciting. I never thought you'd tell me about saving the life of a king.

DR. SKINNER:

Well, I just happened to think of it, Chuck. Now---I want to show you something else - something that even a king doesn't have. I call this my jewel box.

HERNDON:

Say---those are pretty. What are they?

DR. SKINNER:

What do they look like?

HERNDON:

Well---that's a butterfly---and this is a bug of some kind---but I never saw one with such pretty colors---and those red things look like seeds of some kind-----and they're all inside solid glass blocks. How'd they ever get in there?



DR. SKINNER:

One of our men put them in there, Chuck. They look rather nice, don't they?

HERNDON:

They sure do. But I still don't see how he got them inside that solid block of glass.

DR. SKINNER:

Well---I'll tell you. In the first place--that material is not glass. It's a plastic called plexiglas or lucite--which is made from ---well--several materials--the most important of which may come from molasses or oil. We did not develop the plastic-----but we have made use of it in preserving specimens for scientific work. This plastic can be obtained in liquid form-----it looks just like water. The specimen---an ear of corn---or an insect---or whatever it may be---is put in a mold---the liquid plastic is poured in--- and then caused to harden by careful heat treatment. It isn't so simple as I'm telling it---but you get the general idea. Now---the importance of this is not to make cute little trinkets like these---but to preserve scientific specimens of various kinds.

HERNDON:

Specimens---you mean like flowers and leaves?

DR. SKINNER:

Yes---flowers and leaves---although specimens of that kind must be preserved in another way. One of our men has recently worked out a system of treating flowers--fruit--leaves and so on with chemicals so the tissues are made tough---and the color is preserved. Then they can be mounted between sheets of cellophane or some other material that you can see through. The object of all this work is to find a way of keeping specimens in as nearly natural a way as possible--to protect them from air, insects and so on. Schools,





universities, laboratories, and museums all need ways of preserving materials so valuable specimens can be used for study--and we're trying to develop it for them. At the same time---some very attractive exhibits have resulted.

HERNDON:

I'd say they are attractive. Now, Dr. Skinner---have you told me about all the work of the Bureau of Chemistry and Soils?

DR. SKINNER:

Not by any means, Chuck. I haven't mentioned the work we've done in canning citrus fruit juices--our studies of fertilizer ---- making new and better table syrup----our studies of leather and how to preserve it----making paper from straw and cornstalks---well---the list of studies and accomplishments would be as long as your arm if you were to write them down. But there's one piece of work that is so important that we can't overlook it----our work with dyes.

HERNDON:

With dyes----you mean the kind they use on cloth?

DR. SKINNER:

That't it. Before you were born, Chuck, almost all of our good dyes came from Germany. But during the World War we couldn't get any more German dyes---and our American dyes were not "fast". They faded in sunlight, and they washed out and ran when the materials were laundered. So our chemists set to work on studies of dyes----trying to find how to make them better and cheaper. It wasn't long before they found new methods of making dyes---better than any that had ever been made before.

HERNDON:

Even better than the German dyes?



DR. SKINNER:

Yes--better than even the German dyes had been. Since that time the world has looked to America for the finest in dyes. The colors in your shirts--the brilliant print dresses that the girls wear---colors in material of all kinds---are bright and permanent today because chemists in the Bureau of Chemistry and Soils found out how to make some of the world's finest dyes out of coal tar.

HERNDON:

Well it looks to me, Dr. Skinner as though you must have found the answer to almost every kind of problem.

DR. SKINNER:

No we haven't, Chuck. Not by any means. There are new problems to be solved all the time. And our work is continually expanding. Right now we're making plans for setting up four laboratories in different parts of the country to try to find new and wider industrial uses for agricultural products. It's a big attack---on a big problem. Some day--maybe you and some of the other boys and girls who are listening will have a hand in solving some of the world's problems--through science.

(Switch to Cincinnati)

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